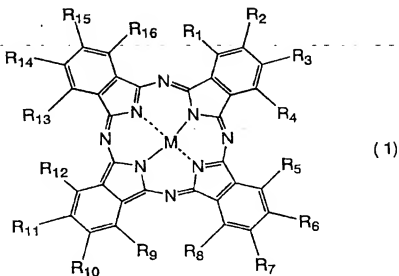


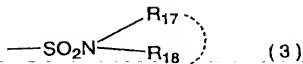
## Claims

1. A phthalocyanine colorant represented by Formula (1):



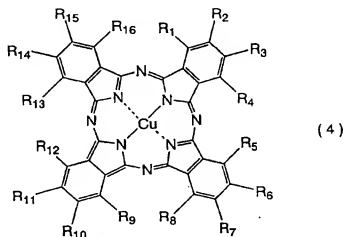
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- [in Formula (1), M represents a hydrogen atom, a metal atom, a metal oxide, a metal hydroxide, or a metal halide; R<sub>2</sub>, R<sub>3</sub>, R<sub>6</sub>, R<sub>7</sub>, R<sub>10</sub>, R<sub>11</sub>, R<sub>14</sub> and R<sub>15</sub> each independently represent an unsubstituted sulfamoyl group represented by Formula (2), a substituted sulfamoyl group represented by Formula (3), or a hydrogen atom, provided that
- 10 at least one of R<sub>2</sub>, R<sub>3</sub>, R<sub>6</sub>, R<sub>7</sub>, R<sub>10</sub>, R<sub>11</sub>, R<sub>14</sub> and R<sub>15</sub> is an unsubstituted sulfamoyl group, and at least one thereof is a substituted sulfamoyl group represented by Formula (3); and R<sub>1</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>8</sub>, R<sub>9</sub>, R<sub>12</sub>, R<sub>13</sub> and R<sub>16</sub> represent hydrogen atoms; the sum of a number of an
- 15 unsubstituted sulfamoyl group and a total number of a substituted sulfamoyl group is 2 to 4, and a number of an unsubstituted sulfamoyl group is 1 to 3 and a number of a substituted sulfamoyl group is 1 to 3.]:



in Formula (3),  $\text{R}_{17}$  and  $\text{R}_{18}$  each independently represent a hydrogen atom, a substituted or unsubstituted alkyl group, a substituted or unsubstituted cycloalkyl group, a substituted or unsubstituted aralkyl group, a substituted or unsubstituted aryl group, a substituted or unsubstituted heterocyclic group, and a substituted or unsubstituted alkenyl group;  $\text{R}_{17}$  and  $\text{R}_{18}$  may form a ring by bonding together except when both  $\text{R}_{17}$  and  $\text{R}_{18}$  represent a halogen atom; and at least one of  $\text{R}_{17}$  and  $\text{R}_{18}$  has an ionic and hydrophilic group as a substituent.

2. The phthalocyanine colorant according to Claim 1, wherein Formula (1) according to Claim 1 wherein  $\text{M}$  is  $\text{Cu}$ , is represented by Formula (4):



, in Formula (4),  $R_1$  to  $R_{16}$  mean the same as in Formula (1).

3. The phthalocyanine colorant according to Claim 1 or Claim 2, wherein in each of combinations of  $R_2$  and  $R_3$ ,  $R_6$  and  $R_7$ ,  $R_{10}$  and  $R_{11}$ , and  $R_{14}$  and  $R_{15}$ , one member of each combination is a hydrogen atom, and the other is an unsubstituted sulfamoyl group represented by Formula (2), a substituted sulfamoyl group represented by Formula (3) or a hydrogen atom, and among  $R_2$ ,  $R_3$ ,  $R_6$ ,  $R_7$ ,  $R_{10}$ ,  $R_{11}$ ,  $R_{14}$  and  $R_{15}$ , at least one is an unsubstituted sulfamoyl group and at least one is a substituted sulfamoyl group represented by Formula (3).

4. The phthalocyanine colorant according to any one of Claims 1 to 3, wherein  $R_{17}$  and  $R_{18}$  each independently represent a hydrogen atom, an alkyl group (which may be substituted with a substituent selected from a group consisting of a sulfonic acid group, a carboxyl group, a hydroxyl group, an alkoxy group, a dialkylamino group, an arylamino group, an aryl group, a halogen atom and a cyano group), a phenyl group (which may be substituted with one or more substituents selected from a group consisting of a sulfonic acid group, a carboxyl group, a hydroxyl group, a dialkylamino group, an arylamino group, an acetylamino group, a ureido group, an alkyl group, an alkoxy group, a nitro group, a cyano group, a heterocyclic group and a halogen atom), a naphthyl group (which may be substituted with a sulfonic acid group or a hydroxyl group), a benzyl group (which may be substituted with a sulfonic acid group) and a phenethyl group (which may be substituted with a sulfonic acid group).

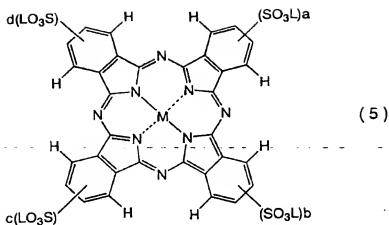
5. The phthalocyanine colorant according to any one of Claims 1 to 3, wherein  $R_{17}$  is a hydrogen atom, a carboxyl(C1 to C5)alkyl

group, a (C1 to C5)alkyl group, a hydroxyl(C1 to C5)alkyl group and a sulfo(C1 to C5)alkyl group; and R<sub>18</sub> is a phenyl group having a sulfo(C1 to C5)alkyl group, a carboxyl(C1 to C5)alkyl group, a sulfonic acid group, a carboxyl group or a hydroxyl group, a benzotriazolyl group substituted with a phenyl group having a di(sulfo(C1 to C5)alkyl) amino(C1 to C5)alkyl group, a sulfonic acid group, a carboxyl group or a hydroxyl group, a phenyl group substituted with a benzotriazol group having a sulfonic acid group, a carboxyl group or a hydroxyl group, a naphthyl group having a sulfonic acid group or a hydroxyl group, a uracil group having a sulfonic acid group, a carboxyl group or a hydroxyl group, a triazol group having a sulfonic acid group, a carboxyl group or a hydroxyl group, a thiazolyl group having a sulfonic acid group, a carboxyl group or a hydroxyl group, a benzothiazolyl group having a sulfonic acid group, a carboxyl group or a hydroxyl group, a pyridine group having a sulfonic acid group, a carboxyl group or a hydroxyl group, and a benzimidazolyl group having a sulfonic acid group, a carboxyl group or a hydroxyl group.

6. The phthalocyanine colorant according to Claim 1, wherein content of the colorant represented by Formula (1) is at least not less than 60% based on total colorants.

7. The phthalocyanine colorant according to any one of Claims 1 to 5, wherein the colorant represented by Formula (1) is obtained by subjecting the phthalocyanine colorant represented by Formula

(5):



(in Formula (5), respectively, M represents a hydrogen atom, a metal atom, a metal oxide or a metal halide; L represents a proton, an alkaline metal ion, an alkaline earth metal ion and an onium ion of an organic amine or ammonium ion; and a, b, c and d are 0 or 1, provided that the sum thereof is an integer of 2 to 4) or a salt thereof to reaction with a chlorinating reagent to convert a sulfonic acid group to a chlorosulfonyl group and subsequent reaction with an amidating reagent in the presence of an organic amine.

8. A phthalocyanine colorant obtained by subjecting 4-sulfophthalic acid derivatives themselves to reaction with a metallo compound in the presence of the metallo compound, followed by subjecting thus obtained sulfometallophthalocyanine compound or a salt thereof to reaction with a chlorinating reagent to convert a sulfonic acid group to a chlorosulfonyl group and subsequent reaction with an amidating reagent and an organic amine.

9. An ink characterized by comprising the phthalocyanine colorant according to any one of Claims 1 to 8, as a colorant component.

10. The ink according to Claim 9, wherein an organic solvent

is contained.

11. The ink according to Claim 9 or claim 10, which is used for ink-jet recording.

12. An ink set characterized, in an ink-jet printer using  
5 not less than 2 kinds of cyan inks with different colorant density, by using, as at least one kind therefore, the ink according to any one of Claim 9 or 11.

13. An ink-jet recording method characterized by using the ink according to any one of Claims 9 to 11 or the ink set according  
10 to Claim 12, in an ink-jet recording method wherein the recording is carried out onto a recording material by discharging ink droplets in response to recording signals.

14. The ink-jet recording method according to Claim 13 wherein the recording material is an information transmission  
15 sheet.

15. Then ink-jet recording method according to Claim 14 wherein the information transmission sheet is a surface treated sheet having an ink image receiving layer containing white inorganic pigment particles on a carrier.

20 16. A container containing the ink or the ink set according to any one of Claims 9 to 12.

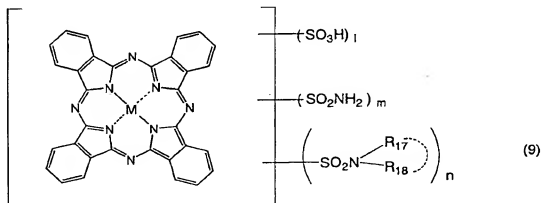
17. An ink-jet printer having the container according to Claim 16.

25 18. A colored product colored with the ink or the ink set according to any one of Claims 9 to 12.

19. A method for production of a phthalocyanine colorant characterized by subjecting 4-sulfophthalic acid derivatives to reaction with themselves or subjecting a 4-sulfophthalic acid derivative to reaction with a phthalic acid (phthalic anhydride)

derivative in the presence of a copper compound, followed by  
 subjecting thus obtained compound or a salt thereof to reaction  
 with a chlorinating reagent to convert a sulfonic acid group to  
 a chlorosulfonyl group and subsequent reaction with an amidating  
 5 reagent and an organic amine.

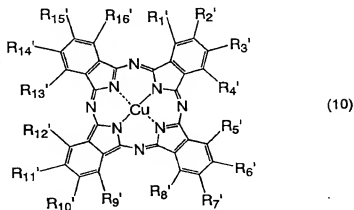
20. A phthalocyanine colorant wherein, in the phthalocyanine  
 colorant represented by the following general Formula (9):



(wherein M represents a hydrogen atom, a metal atom, a metal oxide,  
 a metal hydroxide or a metal halide; l includes 0 and smaller than  
 1; m is not smaller than 1 and not larger than 3.7; n is not smaller  
 than 0.3 and not larger than 3; sum of l, m and n is not smaller  
 15 than 2 and not larger than 4; R<sub>17</sub> and R<sub>18</sub> each independently represent  
 a hydrogen atom, a substituted or unsubstituted alkyl group, a  
 substituted or unsubstituted cycloalkyl group, a substituted or  
 unsubstituted aralkyl group, a substituted or unsubstituted aryl  
 group, a substituted or unsubstituted heterocyclic group, and a  
 20 substituted or unsubstituted alkenyl group; R<sub>17</sub> and R<sub>18</sub> may form  
 a ring by bonding together, provided that except when both R<sub>17</sub> and  
 R<sub>18</sub> represent a hydrogen atom; and at least one of R<sub>17</sub> and R<sub>18</sub> has  
 an ionic and hydrophilic group as a substituent.),

a  $\beta$ -substituted compound is not less than 60% and an  $\alpha$ -substituted compound is not more than 40%.

21. A mixture of colorants represented by the following general Formula (10):



{wherein  $R_2'$ ,  $R_3'$ ,  $R_6'$ ,  $R_7'$ ,  $R_{10}'$ ,  $R_{11}'$ ,  $R_{14}'$  and  $R_{15}'$  each independently represent an unsubstituted sulfamoyl group ( $-\text{SO}_2\text{NH}_2$ ), a sulfone group ( $-\text{SO}_2\text{M}'$ ) or a hydrogen atom, provided that at least one of  $R_2'$ ,  $R_3'$ ,  $R_6'$ ,  $R_7'$ ,  $R_{10}'$ ,  $R_{11}'$ ,  $R_{14}'$  and  $R_{15}'$  is an unsubstituted sulfamoyl group;  $R_1$ ,  $R_4$ ,  $R_5$ ,  $R_8$ ,  $R_9$ ,  $R_{12}$ ,  $R_{13}$  and  $R_{16}$  represent hydrogen atoms; and  $M'$  represents a proton, an alkaline metal ion, an alkaline earth metal ion and an onium ion of an organic amine or ammonium ion.}

22. A mixture of colorants obtained by subjecting 4-sulfophthalic acid derivatives, or a 4-sulfophthalic acid derivative and a phthalic acid (phthalic anhydride) derivative to reaction with a copper compound in the presence of a copper compound, followed by subjecting thus obtained compound or a salt thereof to reaction with a chlorinating reagent to convert a sulfonic acid group to a chlorosulfonyl group and subsequent reaction with an amidating reagent.



# Abstract

The present invention relates to a phthalocyanine colorant characterized in that it has, as substituents, at least one unsubstituted sulfamoyl group and at least one substituted sulfamoyl group, the total number of these groups being 2 to 4, and the unsubstituted sulfamoyl group and the substituted sulfamoyl group are bonded to the phthalocyanine ring at the  $\beta$ -position. Said phthalocyanine colorant is suitable for use in an ink, especially a cyan ink, for an ink-jet printer. A printed matter obtained by printing with said ink is excellent in light fastness, ozone fastness and moisture fastness.